CLAIMS

1. A digital image processing method, comprising the steps of:

extracting chromatic information of an image taken by an image taking device and related to a human subject;

detecting visually interesting regions in the taken image by recognizing areas corresponding to skin of the subject, wherein the recognized areas are the visually interesting regions; and

correcting an exposure of said taken image by normalizing a grey scale of said taken image based on said visually interesting regions.

2. A digital image processing method according to claim 1, wherein said recognizing step comprises constructing a probabilistic slicing of said image taken in a YcrCb format to evaluate if pixels of said image must be classified as belonging to said areas corresponding to the skin of said subject.

3. A digital image processing method according to claim 2, wherein pixels with higher grey values are classified as belonging to said areas corresponding to the skin of said photographed subject.

4. A digital image processing method according to claim 1, wherein said recognizing step comprises applying a threshold area of said image taken in an RGB format to evaluate if pixels of said image must be classified as belonging to said areas corresponding to the skin of said subject.

5. A digital image processing method according to claim 4, wherein applying said threshold area comprises constructing a chrominance slicing histogram of said taken image.

6. A digital image processing method according to claim 5, wherein constructing said chrominance slicing histogram uses normalized channels r and g of the type:

$r = R/(R+G+B)$

$g = G/(R+G+B)$

R, G and B being red, green and blue values of each pixel of said taken RGB image.

7. A digital image processing method according to claim 5, wherein said recognizing step uses said chrominance slicing histogram to detect said areas corresponding to the skin of said subject formed by the pixels of said taken image belonging in said chrominance slicing histogram to said threshold area.

8. A digital image processing method according to claim 5, wherein said taken image is of a Bayer type, the method further comprising:

sub-sampling the image according to $G^*=(G1+G2)/2$, wherein G1 and G2 are first and second green channels of the image, and said step of constructing said chrominance slicing histogram uses normalized channels r and g of the type:

$r = R/(R+G^*+B)$

$g = G^*/(R+G^*+B)$,

R, G and B being red, green and blue values of each pixel of said taken RGB image.

9. A digital image processing method according to claim 1, wherein said taken image is of a Bayer type.

10. A digital image processing method according to claim 9, wherein said exposure correction of said taken image uses:

a simulated response function of a type:

$$f(q) = \frac{255}{\left(1 + e^{-(Aq)}\right)^C}$$

A and C being predetermined control parameters and q being a light quantity value expressed in base 2 logarithmic units; and

a grey average level (avg) calculated on said visually interesting regions, in order to calculate a distance Δ of an ideal exposure situation using:

$$\Delta = f^{-1}(128) - f^{-1}(avg)$$

and in order to change a luminance value Y(x, y) of a pixel with position (x, y) in:

$$Y'(x,y) = f(f^{-1}(Y(x,y)) + \Delta).$$

11. A digital image processing method according to claim 1, further comprising a final color reconstruction step.

12. A digital image processing method according to claim 11, said image being taken in an RGB format, wherein said final color reconstruction step comprises the relations:

$$R' = 0.5 \cdot \left(\frac{Y'}{Y} \cdot (R+Y) + R - Y\right)$$

$$G' = 0.5 \cdot \left(\frac{Y'}{Y} \cdot (G+Y) + G - Y\right)$$

$$B' = 0.5 \cdot \left(\frac{Y'}{Y} \cdot (B+Y) + B - Y\right)$$

R, G, B, and Y being respective red, green, blue, and luminance values of said taken image , Y′ being a desired luminance value, and R′, G′, and B′ being respective red, green, and blue values of the image after said final color reconstruction step.

13. A digital image processing method according to claim 11, said image being taken in a Bayer Pattern format, wherein said final color reconstruction step provides that a grey value I(x, y) of a pixel with position (x, y) is changed in:

$$I'(x,y) = f(f^{-1}(I(x,y)) + \Delta),$$

where Δ is a distance of an ideal exposure situation.

14. A digital image processing method, comprising:

extracting chromatic information from an image of a human subject;

detecting, based on the extracted chromatic information, which areas of the image correspond to skin of the subject; and

normalizing grey scale values of the image based on the areas of the image that are detected as corresponding to the skin of the subject.

15. The method of claim 14, wherein the detecting step comprises constructing a probabilistic slicing of the image taken in a YcrCb format to evaluate if pixels of the image belong to the areas corresponding to the skin of the subject.

16. The method of claim 14, wherein the detecting step comprises applying a threshold area of the image taken in an RGB format to evaluate if pixels of the image belong to the areas corresponding to the skin of the subject.

17. The method of claim 16, wherein applying the threshold area comprises constructing a chrominance slicing histogram of the image and using the chrominance slicing histogram to detect the areas corresponding to the skin of the subject formed by the pixels of the image belonging in the chrominance slicing histogram to the threshold area.

18. The method of claim 16, wherein applying the threshold area comprises constructing a chrominance slicing histogram of the image using normalized channels r and g of the type:

$r = R/(R+G+B)$

$g = G/(R+G+B)$

R, G and B being red, green and blue values of each pixel of the image.

19. The method of claim 16, wherein applying the threshold area comprises constructing a chrominance slicing histogram of the image and the image is of a Bayer type, the method further comprising:

sub-sampling the image according to G*=(G1+G2)/2, wherein G1 and G2 are first and second green channels of the image, and said step of constructing said chrominance slicing histogram uses normalized channels r and g of the type:

r = R/(R+G*+B)

g = G*/(R+G*+B),

R, G and B being red, green and blue values of each pixel of said taken RGB image.

20. The method of claim 14, wherein the normalizing step performs exposure correction of the image that includes:

using a simulated response function of a type:

$$f(q) = \frac{255}{\left(1 + e^{-(Aq)}\right)^{C}}$$

A and C being predetermined control parameters and q being a light quantity value expressed in base 2 logarithmic units; and

calculating a grey average level (avg) of the areas corresponding to the skin;

calculating a distance Δ of an ideal exposure situation using:

$$\Delta = f^{-1}(128) - f^{-1}(avg);$$ and

changing a luminance value Y(x, y) of a pixel with position (x, y) in:

$$Y'(x,y) = f(f^{-1}(Y(x,y)) + \Delta).$$

21. The method of claim 14, further comprising a final color reconstruction step using the relations:

$$R' = 0.5 \cdot \left(\frac{Y'}{Y} \cdot (R+Y) + R - Y \right)$$

$$G' = 0.5 \cdot \left(\frac{Y'}{Y} \cdot (G+Y) + G - Y \right)$$

$$B' = 0.5 \cdot \left(\frac{Y'}{Y} \cdot (B+Y) + B - Y \right)$$

R, G, B, and Y being respective red, green, blue, and luminance values of the image , Y′ being a desired luminance value, and R′, G′, and B′ being respective red, green, and blue values of the image after the final color reconstruction step.

22. The method of claim 14, further comprising a final color reconstruction step that changes a grey value I(x, y) of a pixel with position (x, y) using:

$$I'(x,y) = f(f^{-1}(I(x,y)) + \Delta),$$

where Δ is a distance of an ideal exposure situation.

23. A digital image processor, comprising:

means for extracting chromatic information from an image of a human subject;

means for detecting, based on the extracted chromatic information, which areas of the image correspond to skin of the subject; and

means for normalizing grey scale values of the image based on the areas of the image that are detected as corresponding to the skin of the subject.